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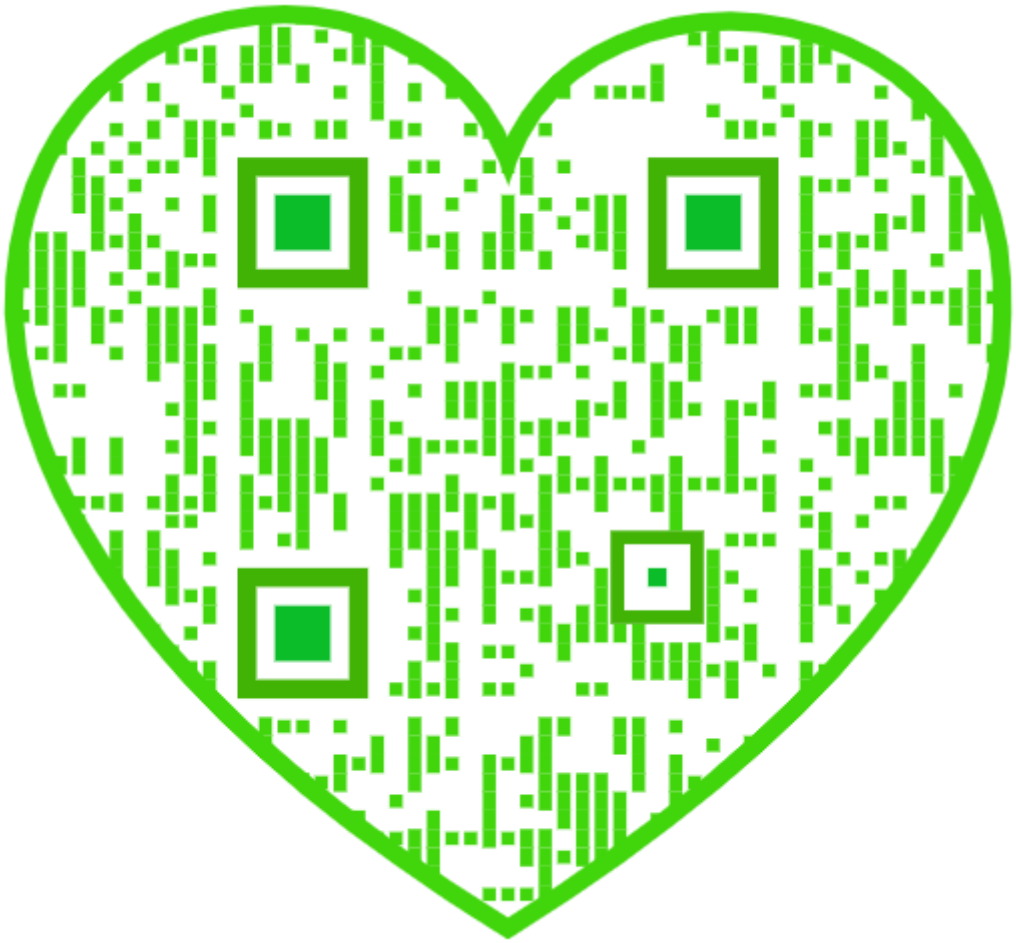

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BULLETIN

OF THE

Department of Agriculture

BEE CULTURE IN MAINE

Issued quarterly from the Office of the Commissioner of Agriculture, Augusta, Maine
JOHN A. ROBERTS, Commissioner

Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized September 19, 1918

Entered April 6, 1903, at Augusta, Maine, as second-class matter, under Act of Congress of June 6, 1900

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WATERVILLE
SENTINEL PUBLISHING COMPANY
1918

INTRODUCTION.

In preparing this bulletin, I have endeavored to treat the subject of bee-keeping in a general way and in terms which may be understood with little study and care even by those who have a limited knowledge of bees or honey production.

A number of bulletins are issued by the Department of Agriculture at Washington, by authors expert in their profession, which treat of bees and their diseases, the different methods of honey production, wintering, and other problems. Most of these may be obtained free of the Secretary of Agriculture, Washington, D. C. Others are available at small cost. This work is not intended to cover the ground so thoroughly, but to treat the subject from the standpoint of Maine conditions particularly, and from the author's own experience, covering over twenty-five years of study, and the care of from a few colonies to one hundred and one hundred and fifty each season.

This is submitted with the hope that it may be the means of creating an interest in this somewhat neglected profession, in the minds of the reader which will lead to a more thorough study of the subject, and the ownership of at least a few colonies of bees which in turn, it is hoped may bring to their owners a measure of the happiness and profit, which my years and labors with these most interesting little creatures have brought me.

I desire to acknowledge the assistance given me by the A. I. Root Co., and others in preparing this bulletin.

Maine Department of Agriculture

QUARTERLY BULLETIN

VOL. XVII. DECEMBER, 1918. No. 4.

BEE CULTURE IN MAINE

By O. B. GRIFFIN, Caribou, Maine

Nearly everyone whose early years have been spent in the country has, at some time in their youth, learned the taste of honey. Perhaps their first knowledge of the most wholesome of nature's sweets may have come from robbing and destroying a nest of bumblebees of their hard earned treasures, or it may have been purchased at considerable cost in pain and facial disfigurement, but who has not felt well repaid after the battle was over and the victory won, and who has not resolved after an acquaintance with the beautiful solid combs of honey of the honeybee (Apis Mellifica), that as soon as possible they would own some bees and produce their own honey. If they did not make such a resolve, it was because they were deterred only by the fear of their stings.

With flowers everywhere during the spring and summer months, many of which secrete nectar, it is really a pity that so few have honey as a part of their bill of fare, or even know of its real value as food.

Until recent years many physicians had very little knowledge of honey as an article of food, especially for patients who perhaps could not partake of cane or beet sugars or much solid food. There are some who cannot eat honey, but only a very few. Such people are presumably affected by the small trace of poison contained in the honey since a small piece will make them very sick. There are also a few people to whom the sting of the bee will cause serious trouble, while a few stings would undoubtedly cause death, but such cases are rare. Those who like honey but cannot eat it clear, are able to eat

it freely if taken with a glass of milk, or cream eaten on it. The two appear to be associated: The ancient Isrealites traveled many years to reach the "Promised Land, a land said to be flowing with milk and honey." In other words, it was a great grazing country with flowers and wild bees abundant.

While Maine is not a bee-keeper's paradise, much can be accomplished with bees if the proper care and housing is given them. As honey is a valuable food, as well as a waste product without the aid of the bees, people should be encouraged to save and use it. Honey is not the most valuable product of the bees. As an agent in the distribution of pollen, the fertilizing property of flowers, the value of the bees in increased fruit production and in better fruit, is hard to estimate.

The Maine winters are nearly always severe and the springs fickle. Wild bees, bumblebees, etc., which would be of great value if present in large numbers, often perish during the winter and cannot be depended on. The fruit grower has it largely within his power to so protect the honeybee that he can have them present in his orchards in the desired numbers when he needs them. There seems to be little question that there are years in which the apple crops are nearly a failure, or a light crop, in certain localities, when, had the bees had access to the trees, there would have been a profitable yield. Nearly all the tree fruits and berries need the bees to insure a profitable crop. Some strawberry growers do not think the bees are needed in the strawberry bed, as the winds are supposed to do the work of pollination satisfactorily, but I am satisfied, from my own observation and the evidence of others that even in the strawberry patch it pays to have the bees.

When the expenses of maintaining a few colonies of bees is slight, or nothing at all, and often a crop of honey is secured that pays for all labor and expense, it would seem to be the part of wisdom to see that bees are provided wherever fruit is grown.

An apiary of fifty or one hundred colonies of bees, in ordinary localities, would care for the bloom of orchards within a mile or a mile and a half of the yard, but it is better to have a few colonies located in or near the orchards.

Bees will naturally fly to a distance of one-fourth to one-half mile, almost as readily as they will work the bloom of the tree standing near the hive, therefore in a region where fruit trees are grown on most farms, it would be better if all kept a few colonies to insure cross-fertilization of the bloom.

Elsewhere I have described methods of honey production, and the fruit grower will have to decide for himself which method best suits him.

Anyone who has reached their teens and who are not seriously effected by their stings may learn to care for and handle bees, and produce honey. However, I would not advise anyone who did not have a real interest in the bees themselves to undertake the care of them, except in a limited way. Without a real interest in the bees and their labors, and a love for the work, neglect will follow, which means not only a loss to the owners but endangers the bees of others for miles away bringing loss to those who are helpless to prevent it. If one is not willing to give the bees the necessary care which will protect them from starvation, natural enemies, cold and bee diseases, they owe it to the industry and themselves not to undertake it. It will be much better for them to do something in which they are interested and encourage others already engaged in the pursuit to increase the number of colonies which they keep by buying their honey of them. It is better that there be a half dozen well kept apiaries within a radius of about a mile than three times the number of colonies kept under neglected conditions.

The average Maine farmer who manages a farm and carries on mixed farming is almost certain to neglect some branch of the work at times. If he undertakes to keep and care for bees he cannot expect to get the results that the specialist will, for there will be times when the pressure of other farm work will prevent his giving the bees the care and attention that they require, and for which they will repay in an increased amount of surplus honey. Under these conditions, the bees may not produce more than half the crop of honey they otherwise would, had proper care been given at the right time. However, the returns from the bees may have been enough to pay for all labor and supplies and a fair profit on the investment. If the care given has been sufficient to prevent wholesale robbing, kept

the bee moth from increasing and foul brood or other diseases from getting a foothold in the apiary, the bee-keeper has not in any way been a menace to others. The amount of honey secured has been that much of an otherwise waste-product saved and has become a valuable and pleasant food for human consumption. The bees have also performed a great function for which they were undoubtedly created,—the better fertilization of fruit bloom and flowers, thereby increasing the amount of fruit which has become a natural and valuable food for human use.

How to Get Started With Bees

When one's interest and desire to undertake the care of bees and production of honey has been aroused, if only to supply their own table, one is often troubled as to just how to go about it.

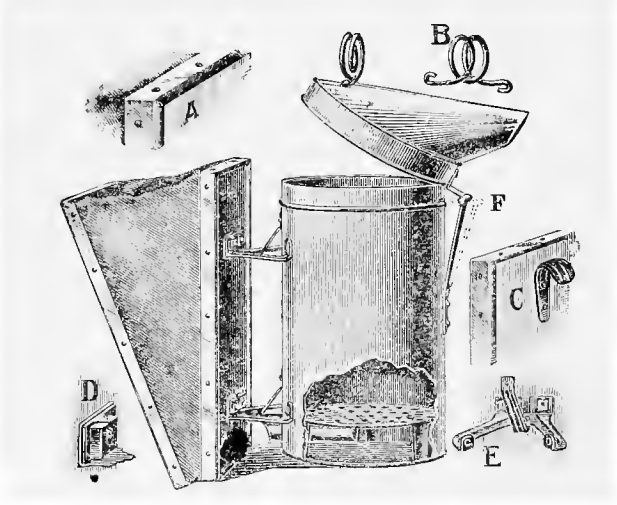


Fig. 1.—A good smoker, an indispensable tool in the apiary

There are some things which every beginner should possess as soon as they become the owner of a colony of bees, which are named in the order of their importance.

A bee-smoker (see Fig. 1) and veil, a pair of gloves which will protect the hands and wrists from stings, which may all be

obtained from any of the dealers in bee-keeper's supplies; a textbook on bees or the bulletins furnished by the Department of Agriculture at Washington (both if possible), and at least one of the bee journals. The gloves are worn by few experienced bee-keepers, and many do not use a veil but it is good judgment for the novice to wear a veil until accustomed to being around bees. The gloves are not a necessity but will be needed and if kept handy may be worn when it is necessary. A good smoker is shown in accompanying cut. Equipped with these, the beginner could have one or a few colonies of bees which may be obtained in different ways at any time from spring to early winter. The start could better be made in the spring, when the bees are safely through the winter, about the time of fruit bloom. If there is a reliable bee-keeper near you, have him select one or two of his best colonies, in modern hives, (see Fig. 2) and if a reasonable man, pay him his price. If bees cannot be secured near-by, they can be purchased at a distance of even several hundred miles, and shipped by express. Unless purchased of an experienced bee-keeper they should be cau-

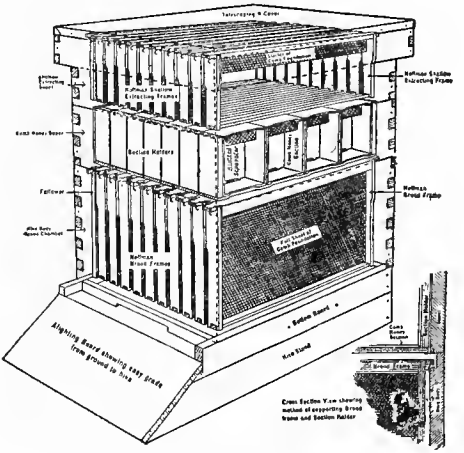


Fig. 2.—A modern hive complete. Cut away to show arrangement of brood chamber and super arrangement

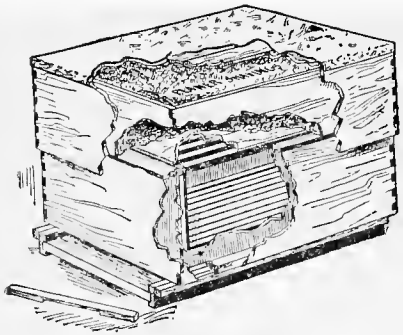


Fig. 3.—The Buckeye or Root double wall hive

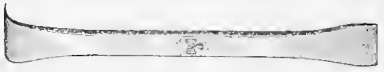


Fig. 4.—A hive tool, almost a necessity

Fig. 5.—A bee brush, for brushing bees off the combs or off a post, etc.

tioned to use extreme care in preparing for shipment, and in delivering to the express company, being careful to provide ventilation in proportion to the size of the colony and the weather. If warm weather, and bees are to be confined more than twenty-four hours, water should be provided. A simple way is to saturate a clean cloth or sponge with what water it will hold and lay it on the bottom board under the frames. If possible, avoid shipping when combs are too heavy with brood. About the time of apple bloom in spring or during September is a better time than the intervening months. If they cannot be obtained in modern frame hives without too much expense and trouble, they may be secured in any sort of hive and the new swarms hived as they issue in modern frame hives.

Bees should not be moved any distance in the fall unless one is sure they could have a good cleansing flight before going into winter quarters. I would much prefer that the weather be warm enough for a good flight soon after they were moved.

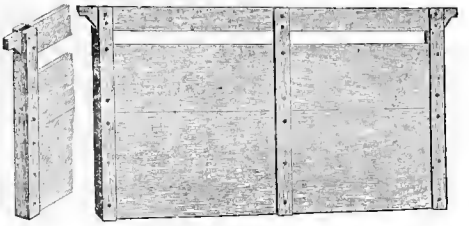


Fig. 6.—Division-board

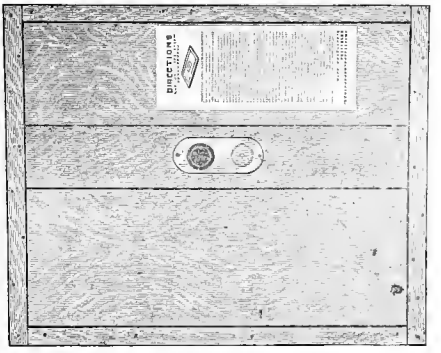


Fig. 7.—Escape board, used to remove bees from supers

The hives for the new swarms should be secured well in advance of the swarming season to avoid delay and loss. The same is true of other supplies needed. Many delay until needed and it is often impossible for the supply dealers to fill the orders for a long time after they are received, and delays in transit are not uncommon. I would strongly advise the average person not to undertake to make their own hives until they know by experience that they can do so. If one is to keep many colonies, it is important that all hive parts should be interchangeable and fit exact. Unless one is handy with tools, this requires extreme care. Hives and hive parts may be bought of the supply manufacturers or large dealers in the flat or knock-down, nailed and painted, without much trouble even by one inexperienced. It is advisable to order one hive complete and ready as a pattern.

For Maine conditions I advise a beginner to select a ten frame hive taking the standard Langstroth frame (see Fig. 8). These may be fitted with the style super desired, either for section honey, taking different styles of sections, or for full or half depth supers, if it is to be run for extracted honey (see Fig. 9).

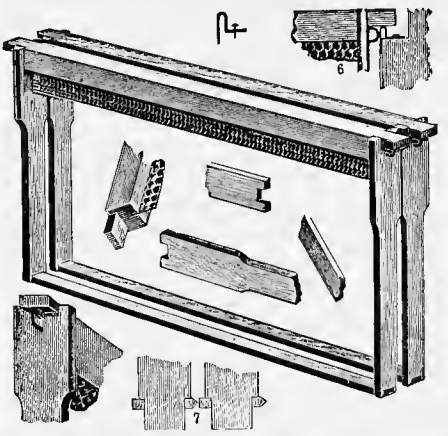


Fig. 8.—Standard Langstrothe frame with starters in place

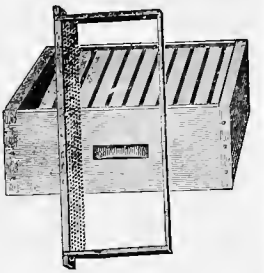


Fig. 9.—Half depth extracting super and frame with starter

Honey in sections and in frames may be secured from the same hives during the same season if desired, provided the season is favorable. This style of hive may be provided with outer cases for outdoor wintering, or wintered in cellar.

If bees are purchased at a distance, get them as soon as possible to the location where they are to remain and let them fly out at will.

Stings

Many are deterred from undertaking the care of bees because of the fear of their stings. Very few people are seriously effected by the sting of the honeybee. Many suffer considerable pain and much swelling from the stings, while others suffer considerable pain for the first few minutes but experience no ill effects afterwards, not much more than a sharp pin prick. Where one is seriously effected they should not handle bees, as serious, even fatal results may follow. As a rule one becomes somewhat immune to the poison, and the effects are felt less and less. Much can be done to avoid the

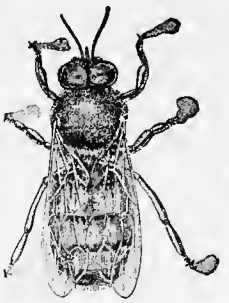
effects of the sting by instantly removing the sting, by scraping it out with the finger nail, the edge of some sharp instrument such as a knife blade, or rubbing it out on the clothing. Do not attempt to pull it out as the poison sack at the end of the sting is torn away from the bee's body and the adhering muscles automatically force the contents of the sack into the object stung. In pulling the sting out with the fingers, the contents of the poison sack are injected into the system and the effects are much more marked. One can also do much to avoid stings by being careful not to anger the bees. Always move carefully about the hives. Do not breathe directly on the bees as all animal odors seem objectionable. Avoid handling them when perspiring freely. Do not jar the hives, rip off the cover or yank out the frames. Always avoid opening hives when the weather is very cool. The warmer the day the less the bees resent having the hive opened. For this reason all manipulations of the colonies should be during the warmest part of the day.

There are few remedies that are of much good. Moist earth or crushed plant leaf seem to relieve the sting when first applied. Liniments as used about the home help but little. If the parts are bathed with hot water, the pain is relieved but the swelling is increased. If ice can be applied immediately after the sting, it will draw the poison out but will pain intensively while it is being applied.

What Constitutes a Colony of Bees?

A normal colony of bees, at the opening of spring or when first put into winter quarters, consists of several thousand bees, varying from five thousand to perhaps five times that number, and a queen or mother bee (see Fig. 10). Later in the season, from May 15 to June 1 in this State, the drones or male bees (see Fig. 11) begin to appear, and during the summer months some colonies may have as many as several thousand. The colony may have their dwelling place in a modern hive or some later modification of this, a straw skep, or a hollow tree in the woods. From the cuts here shown, one should be able to easily distinguish the different members of the

colony. The queen is not often seen without opening the hive, and even then it is not easy for the novice to locate her.



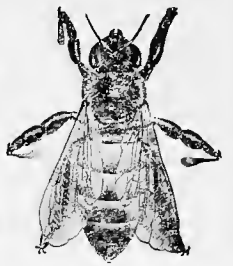


Fig. 10.—Queen Bee **Fig. 11.**—Drone Bee **Fig. 12.**—Worker Bee

Functions of the Bees

The worker bees (see Fig. 12) are females which are not fully developed, and structurally modified in some ways from the queen, the fully developed female.

The queen's eggs which produce the natural worker bees in twenty-one days, may produce a queen in sixteen days. The size of cell in which the baby queen is cradeled and the quantity and quality of food fed her apparently changes the destiny of the common worker, one of thousands to be the mother bee of the colony, at times the mother of every bee in the hive except herself. The functions of the worker bees are varied and many. They build combs from the wax secreted by their own bodies, gather nectar from the flowers of trees and plants, carry it to the hives and deposit it in the combs to ripen it, largely by their own efforts until it becomes honey when they cap it over or seal it as the housewife does her canned fruits until the time of need. They also gather pollen, the fecundating dust of the anthers of flowers, in the pollen baskets with which nature has provided them and store it in the combs for future use as food for the adults and baby bees. They bring home quantities of water, clean house in the spring, keep it clean during the summer or active season, guard the entrance to the home and, if need be, defend it with their lives. They feed and care for the young bees, protect so far as they are able the mother or queen,

search out new sources of honey and a new home when this becomes necessary for the colony to cast a new swarm—nature's way of increasing.

The queen is the mother bee and her sole function is to lay eggs. After hatching, she will take several short flights going a little farther from the hive as she gains strength, the weather having much to do with this, when she takes what is called her bridal flight, and, if successful, meets the drone or male bee and mates while on the wing. By this act she becomes fertile for life, at least continuing to lay eggs for several seasons which produce workers, queens and drones without again mating. Some investigators claim that in some rare instances the queen mates more than once. A young queen rarely attains her best in the first season but does in her second and fails quite rapidly after this. Some undoubtedly live until the fourth season and may have done good work in the third.

Many progressive bee-keepers practice superceding all queen bees at the close of the second season, putting in their place young mated queens of selected stock, unless it be some queen whose record and ancestry warrants giving them another season of life. The young queen before mating is called a virgin queen, and usually begins laying in two or three days after a successful mating flight. When a queen bee begins to fail, if allowed to live, she may lay eggs which produce only drones and is known as a drone laying queen. The colony will then soon dwindle out and be lost unless requeened at once or united with a colony having a laying fertile queen. In a queenless colony, a worker sometimes develops the ability to lay eggs. Such a colony is worthless until united with one having a queen. If the virgin queen of one race mates with a drone of another, her progeny will be queens and workers half-breed of each race,—sometimes improperly called hybrids. The drones are not apparently effected by the mating and are pure blood of the race of the mother. The drone is the male bee and so far as we know, his sole function in life is to meet and fertilize the young queens. In this respect we see a wonderful provision of nature. Thousands of drones are in the air at the time the virgin queen takes her bridal flight. Her wing powers are such that only the swiftest and strongest can overtake her.

Thus the wing power of the species is kept up. The mating of the queen is almost beyond the control of man.

Something may be accomplished, however, by encouraging the production of drones in one or more of the best colonies, the workers of which are known to possess the desired qualities, and by restricting to the least number practical in the undesirable colonies. Even then, if other bees are within two or three miles, either domestic or in hollow trees in the woods, a large part of the queens may mate with these. The production of drones should be kept down as much as possible in all other colonies. This is best accomplished by using full sheets of foundation in the brood frames when hiving new swarms, and by replacing drone comb with worker comb. Drones pass off the stage of action at the close of the honey harvest. So long as nectar is coming in freely they are allowed to live but when it fails to a certain point, they are dragged outside by the workers and not allowed to enter, where once they were welcomed or at least tolerated boarders. They soon perish of starvation and cold. The presence of drones in a colony late in the season is an indication that they are queenless, or have a worthless queen. In such cases, a queen should be given them at once or the colony united with a normal one.

TABLE SHOWING DEVELOPMENT OF EGG TO THE ADULT BEE

	Queen No. days	Worker No. days	Drone No. days
Egg	3	3	3
Larva	5½	6	6½
Pupa	7½	12	14½
	16	21	24

Location of an Apiary

Care shouldd be taken in the selection of the place where the bees are to be kept. They should not be located near a place where people or animals must frequently pass. If it must be done, a tight board fence should be erected between the street, road or path and the bee yard high enough so that

the flight of bees will be well above the heads of the passers-by. Neither should they be located too near the premises of another. This may be done in some cases where care and wisdom are used.

Bees are often kept in town or city even on the flat roofs of buildings. From a shelf built on the side of a tenement block where the bees were cared for through the window, a woman provided her table with honey gathered by her own bees, even though secured under some difficulties. Where one has the will to keep a few bees, a way can usually be found.

A sheltered location is desirable where the hives shall be protected from the wind, especially from the north wind. If no natural shelter is present, a board fence can be made to serve the purpose. Evergreen trees make a fine shelter and, when once established, need little attention. If trees are large and near the bees, it is sometimes troublsome to secure the swarms which cluster on them. If the location is so much sheltered that the sun warms it to a point where bees are enticed outside in weather that is not suitable for a safe flight, the bees will drop and perish especially in the fickle weather of our Maine springs, and much harm is done. The yard should not be located too near a body of water since heavy laden bees will drop into the water and be lost as they return to the hive. If twenty-five rods away from the water, losses will be much less than if located within that many feet.

Sources of Honey and Range of Flight

If only a few colonies of bees are to be kept, there need be no worry about pasturage as in nearly any location in Maine a few colonies will find enough nectar-secreting flowers within their range of flight.

With limited numbers, it may be possible to plant or have planted those crops which will furnish nectar and still provide a crop such as alsike clover or buckwheat, usually a paying proposition alone.

Bees fly naturally, under normal conditions, a distance of from one to one and one-half miles in quest of nectar, even with acres of flowers near the bee yard. There is reliable evi-

dence to show that bees have gathered and stored nectar in the supers at a distance of over five miles. This is very rare. However, a distance of three miles is quite a common range of flight when the conditions are favorable. The sources from which bees obtain nectar in this State are of interest to all beekeepers. In most localities, especially where many colonies are kept, the need of early blooming nectar-secreting flowers is of great importance. Most of the forest trees furnish either pollen or nectar and sometimes both. Some years, the weather is so unreasonable that the forest bloom is largely lost. Pussywillow is one of the most dependable sources. It rarely fails to furnish both pollen and nectar at a time when most needed to start brood rearing in earnest, and in favorable years, strong colonies often store some willow honey in the supers. Poplar is the first to bloom as a rule and the pussywillow a close second. There is often quite a space from this to fruit bloom especially the years in which the forest bloom is either very light or a failure.

Cherry, plum, apple and pear, in years when the weather is favorable, give the bees the much needed stores of pollen and honey to keep up brood rearing and, with the aid of different spring blooming wild flowers, carry the bees to clover bloom.

Among the plants, the dandelion is of great value. While a fickle plant, and depending greatly on weather conditions as to the amount of nectar secured, it never fails to bloom and furnish pollen so much needed at this season of the year, and at least some nectar. In favorable years, strong colonies will often fill every available space in the brood frames and a super besides. In some states the dandelion is counted of little use as a honey yielding plant, but for Maine it is valuable. Strawberries furnish pollen but probably very little nectar. Wild raspberry is one of the plants to give a surplus in the northern part of the State. White clover begins blooming about the same time, while alsike also blooms before the raspberry has gone by. Alsike clover is the main source of the surplus flow in Aroostook county where almost every farmer sows two or more pounds of alsike seed per acre in seeding down. Two to five pounds per acre in favorable soils, and it thrives in most soils,

will give excellent pasturage and the flavor of the honey is superior.

Fireweed is the last wild flower of real value to bloom with the exception of goldenrod. In Aroostook, when the county was being cleared of the virgin forest growth, fireweed sprang up everywhere and was one of the main sources of supplies and much appreciated by early pioneer bee-keepers. The honey is very clear, almost transparent, and of mild flavor, but granulates quite quickly if not carefully kept.

Goldenrod, of which there are several varieties, is not a dependable plant in the northern part of the State. It blooms too late in the season when the nights are too cold for nectar to secrete freely. About one year in four, the flow will be fairly good and contributes largely towards the winter stores and the keeping up of the late brood. This is highly desirable in a locality where the winter confinement often continues for five or six months without a flight. In the southern part of the State, goldenrod is often valued highly. In localities where buckwheat is grown in any quantity, it is of much value in late summer both as a source for winter store and surplus. In Aroostook, the rough buckwheat, sometimes called India wheat, is almost wholly grown and is of no real value to the bees though producing an excellent flour.

The Japanese varieties do not produce nearly as satisfactory yields of grain without the aid of the bees, while the rough buckwheat does not need their assistance.

Following is an incomplete list of trees, shrubs and plants which are valuable to honey bees, as sources of pollen, honey, or both, listed in nearly the order of blooming. A detailed list may be found on page 54 under the subject " The Honey Flora of Maine," by John H. Lovell, one of the best known botanists in Maine.

NAMES	YIELDS	COLOR	QUALITY
Poplar	Pollen		
Pussy willow	Pollen and honey	Dark	Poor
Wild flowers	Mostly pollen		
Forest bloom			
Beech, maple and elm	Pollen (Some years considerable honey enough to tide the bees over to fruit bloom.		
English willow	Pollen and honey		
Dandelion	Pollen and honey	Amber	Good
Strawberry (Wild)	Pollen		
(Cultivated)	Pollen and perhaps a little honey		
Fruit trees	Pollen and honey	Amber	Fair
White wood	(Alternate years)		
(Soft maple bushes)	Pollen and honey	Dark	Good
Sorrel	Pollen (Possibly a little honey)		
Wild raspberry	Honey and some pollen	Light amber	Excellent
Cultivated bush fruits (Need the bees)	Pollen and honey		
White clover	Pollen and honey	Light	Good
Alsike	Pollen and honey	Light	Excellent
(Main source of surplus in Aroostook)			
Wild mustard	Pollen and honey	Light amber	Good
(Wild mustard bloom from early grains to the late planted potatoes)			
Fireweed	Some pollen and honey	Light	Good
(Milkweed family)			
Buckweat	Pollen and honey	Dark	Good
(Japanese, Silver hulled, etc.)			
Thistles, smart weed and some other weeds	Pollen, honey, or both		
Goldenrod	Pollen and honey	Amber	Good
Squash, pumpkin, cucumber and melons	Pollen and honey		

Swarming

Swarming is the result of a prosperous condition at the proper season of year. With the warm days of spring, the queen begins laying and, as natural pollen and nectar increases, the queen increases the number of eggs from a few hundred to as many as three thousand in twenty-four hours. While only the better queens attain the higher number, probably many queens reach nearly two thousand.

The brood combs soon become filled with honey, pollen and brood in all stages of development, and the queen is restricted for room to lay at a time when nature prompts her to do her best. (Plenty of super room given at this time and the removal of combs of hatching brood to be replaced with full sheets of foundation, a few at a time, does much to prevent swarming).

The bees start queen cells, the queen deposits eggs in them and in eight or nine days, sealed queen cells are present. If the weather is favorable, the swarm issues. At first, only a few bees appear marching out of the entrance, apparently with minds and hearts fixed on some one thing. These are followed rapidly by ever increasing numbers until it looks like a stampede. Thousands are in the air and still they come as though the last bee meant to leave the parent hive for good and all. In a few minutes they begin to cluster and settle down on the branch or trunk of a tree, a fence rail, or almost any nearby place which may appeal to them. If trees are near, a branch is most often selected and this is the most desirable place for the bee-keeper. Soon, all is still and the cluster hangs quiet, like some strange fruit which may have grown over night. From five to fifteen minutes may pass before the cluster is quiet. The cluster should then be shook down and hived as soon as possible since they sometimes break clusters and leave for parts unknown in half an hour. Usually they will remain for an hour and sometimes longer but they are apt to depart any time after one hour. Safety lies in not leaving them too long. Ten to fifteen minutes after they settle down and are quiet, they should be hived. For this reason, the hive for the new swarm should always be ready and near at hand.

While one may use starters in brood frames, it pays to use full sheets of foundation well wired in. The foundation should

be medium and heavy. Light brood may be used but is liable to sag or break down if a heavy swarm is hived on it unless it has first been given to a strong colony as a super to draw out and fasten securely. This is a safe practice in any case where swarms are united, though there will be little trouble where heavy brood foundation is used if securely fastened and wired in frames.

To the novice who takes down his first swarm, it is usually an experience filled with considerable misgiving and doubt but it is really a simple process if the cluster has settled on the branch of a tree and can be easily reached.

First, place the prepared empty hive on the ground near where it is to remain, block up the front end off the bottom board with one or two inch blocks, lay a board on the ground in front of the hive and level with the bottom board. Then use a light shallow box six inches deep in which to catch the swarm. This may have a handle fastened to the bottom. It will be safer for one to wear a veil, and the novice should also wear gloves. The smoker should be lighted and ready to give off a good volume of smoke if needed,—it is not often used but it should always be at hand. If the swarm is cross and the bees leave the cluster and attempt to sting, which is rare, blow a few puffs of smoke into the cluster. In most cases they will be found to be gentle and may even be taken in the bare hands if care is used not to jam them. When all is in readiness, hold the box close up under the cluster and give the limb a quick jar. Another quick snap and most of the bees will be in the box. Carry them quickly to the hive and pour gently out in front. Those left in the box may be jarred out with a quick shake. Enough may go back so that the operation may need to be repeated. The bees will soon enter the new hive and can be set on a permanent stand. If a strong colony, they should be given one or more supers at once owing to the time of season. When the prime swarm issues the old queen comes with them. From a few to perhaps twenty queen cells are left. With the emerging of the first young queen, the old colony is apt to cast a second swarm, usually about the eighth to tenth day. If the bees decide to swarm no more, the remaining queen cells are destroyed and, when the young queen mates, which will be in about a week, the colony settles down again to normal condi-

tions. If a third swarm is thrown, it usually issues in about one to three days after the second.

For taking swarms down from tall trees, a swarm catcher (see Fig. 13) is a very convenient thing. This may be attached to a long pole. The pole may be in sections but needs to be strong and securely put together.

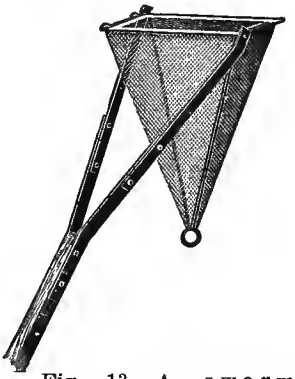


Fig. 13.—A swarm catcher. With this a swarm may be taken down from a tall tree

Races of Bees

There are several races of bees in the United States all of which, without doubt, were at some time imported from European countries. The common Black or German bee was the one first known in America and was imported into Florida about the year 1763 by the Spaniards. There may have been and probably were later importations. Bees evidently found conditions more favorable to colonization than those who imported them, for they appeared in Kentucky in 1780, in New York in 1793, and west of the Mississippi in 1797, and can now be found in every state in the union. They were familiarly known to the Indians as "The White Man's Fly," "The Stinging Fly," and "The Honey Making Fly." Some authoratives claim they were introduced into New England (probably from England) as early as 1638. Harbison took one hundred and sixty colonies (with a loss of only six) from Pennsylvania to California by the way of Panama in 1857. The same year the

first bees were shipped from San Jose to Hawaii. The three best known of the races in the United States are the Italians, the Black or German, and the Carniolians. In recent years the Caucasian breeders are claiming good qualities, for this race especially that of gentleness. Among other races are the Egyptian, Syrian and Cyprian.

The Carniolians are natives of Austria and resemble the Black or German bees closely in appearance. They show somewhat more distinct bands and are rather a grey bee. Their friends claim for them gentleness and prolificness of queens, good comb builders and honey gatherers, that they winter well and build up early in spring under adverse climatic conditions, all of which claims I consider well founded from my own experience. Their tendency to swarm is even stronger than with the Blacks, and I find it rather more difficult to unite swarms of this race than either Italians or Blacks. The only real objection I can offer to Carniolians and their crosses between Black and Italian is that they swarm badly in comb honey production.

No other bee is so largely bred and kept for honey production in the United States by progressive bee-keepers as Italians. The first living Italian bees were landed in this country in 1859, and since then many importations have been made. They vary in color from bright golden to a very dark shade known as leather colored. In disposition, they are gentler and more easily handled than Blacks though none claim they lack ability to sting if thoroughly angered. They are generally considered better honey gatherers than the Blacks but hardly as good comb builders. Some comb honey producers prefer the Blacks or an Italian cross as they, as a rule, cap the honey so as to give it a whiter appearance, though there are some strains of Italians that excel others in this respect of producing white honey. For the production of extracted honey, it is very doubtful if there is any bee superior to them, especially in a climate where the season is a little longer than ours and where the bloom of flowers is a little later in the season.

In justice to the Blacks, I wish to say that so far as my own observation and experience goes, in Aroostook county, they have not proven superior to our common bees. I have tried in a limited way the Golden, three banded and leather colored

Italians from Massachusetts, Pennsylvania, Ohio and Texas, and in each instance, they were a disappointment. They did not winter so well nor build up as readily in spring as the Blacks and they swarmed quite as much. In all of these qualities, they are supposed to be superior to our native bees.

My own experience has been the common one of all who have tried them in Aroostook, so far as I am able to learn. I am not able to say what results have been obtanied in the other counties of Maine. There have been both favorable and unfavorable reports.

Swarm Control

In comb honey production, the bees have to be crowded to get the best results in the super. In other words, they do not enter a comb honey super as quickly, separated as it is in smaller compartments. In consequence, it requires greater care in the control of these colonies to prevent swarming.

As the weather gets very warm, the entrance must be enlarged to full width. This can be done gradually as the strength of the colonies increases. Some use an entrance two inches in depth, others practice raising the hives on inch blocks. This provides excellent ventilation but has the objection of compelling the bee-keeper to work in front of the entrance regardless of which side he is on. Again, when the hive is dropped back at the close of the flow, there is some confusion among the bees for sometime. Neither are serious objections. Some bee-keepers practice clipping the wings of the queens. This prevents the prime or first swarm from leaving, or the loss of valuable queens. Since the queen cells have been built and sealed at the time the first swarm issues, it will only be a few days until the swarm will issue with one or more virgin queens present and the liability of loss of swarm has only been delayed by clipping. In case a queen is valuable as a breeder, she should be clipped, care being taken not to clip a virgin queen as she would then have no value. The process of clipping is simple. Pick the queen up between the thumb and forefinger and, with a fine pair of scissors, cut off one wing. Care should be taken not to jamb the queen. By having all clipped queens, one is able to keep track of them better, as an unclipped laying queen,

where a clipped one has been, would indicate that the bees had for some reason replaced her, an action called supercedure.

One may go through each colony carefully about every eight days after the swarming season is on and cut out all queen cells, but this requires considerable time and care. If cells are overlooked, a swarm is apt to be lost. It should be remembered, that a swarm rarely issues with a young queen in her first laying season.

Our Method in Comb Honey Production

We feel that our own method is a fairly good one for the busy man who can be in the yard during the swarming period. We practice giving plenty of super room at all times until near the close of the flow, giving bottom ventilation and enlarging the entrance. The bees are then allowed to swarm. We plan to be in or near the yard through the middle of the day when the swarms are expected. As they issue, we hive two strong colonies together, more if second or small swarms, removing the least desirable queens and pinching off their heads. The hive is then placed on the stand of the queen that has been killed and the old hive is placed on the hive of the colony whose queen has been saved. By this method we have a strong colony of field bees in the new swarm ready for the harvest.

As supers on the hives from which the swarms issued are usually partly filled, these are placed on the new swarm with an empty one underneath or on top, as the season and flow may influence us.

The old colonies, being united, are not as apt to swarm again, as they have twice the room but if they do swarm, which we rather count on, we have one swarm of double strength where we would have had two to unite. Three or four are often tiered in this way. These united colonies give results in the supers if there is any honey to be had.

In an apiary of about thirty colonies, this plan can be followed with success and particularly so where it is desired to keep down the number of colonies in the yard. Often several colonies unite themselves at swarming time. These should be hived as one unless increase is desired and, as soon as possible after the cluster settles down, as they are more apt to leave than a

swarm with their own queen alone. If too many swarms unite, it is better to divide them, as too heavy a swarm does not take kindly to this condition.

We do not try to secure the first early flow of honey in the supers, as in our location, it is apt to be dark in color, and does not command as high a price as the later flow. One practice is to give all colonies, which need super room before the white honey flows, an extra brood chamber. Dark honey can be stored in this and later used to give colonies which may be short of stores. The brood in combs may be given to weak colonies and supers then given the colony at the opening of the white honey flow. As the colony is apt to be heavy with brood at this time, if increase is not desired, it is best to remove a few frames of sealed brood and give frame filled with full sheets of foundation.

If working the bees for extracted honey, the early flow or any flow which is dark may be extracted or sold by itself.

Uniting

It is not a difficult feat to unite swarms or colonies when nectar is coming freely, but at other times one has to be extemely careful. In springtime, two colonies to be united may be handled somewhat differently. One method is to carry the weaker colony to the stand of the stronger one, first smoking them a little. Smoke each colony enough to cause them to fill the honey sacks so that they will remain quietly on the combs. Find the queen least desirable and dispose of her, then remove from the other colony the frames which do not contain brood, take from the colony whose queen has been disposed of, one at a time, the frames of brood and bees and place in the other hive, alternating them first one of Colony No. 1, then one from Colony No. 2. If any space is left, replace combs containing new honey and pollen, then sealed stores and cover frames with quilt or board and smoke at entrance a few good puffs. Close hive for a few hours or over night if done late in the day. When hive is opened, a board should be leaned against entrance for a day or so to help the bees of the moved colony locate their new home.

Another method is to smoke both colonies gently, then set the weaker colony over the other with two thicknesses of newspaper between, through which a small hole may be punched the size of a pencil. There should be no way of exit except through the lower hive if one queen is to be destroyed. In a few days, or more, proceed as in the first case except that less smoke need to be used. If one wishes, after forty-eight hours, the upper colony may be provided with a separate entrance and allowed to keep their queen until the opening of the surplus flow when the two colonies may be united and the extra brood given to the weaker colonies. A weak colony will build up much faster when placed over a stronger one. This should be done at a time when no bees are flying or many may be lost, and care should be used that they mark the new location. Bees will hang around the old location when a colony has been carelessly moved until many or all perish.

Closing the hive for twenty-four hours or a less time, if a board or small obstruction is placed in front of entrance at an angle, will cause them to mark the new location and return though some may fly about the old one for a few days.

Each colony is supposed to have its own colony odor by which they are enabled to distinguish their own members from others, or to quickly tell their own queen from another. The odor of queens is apparently stronger than that of the workers.

If bees are to be united late in the fall, I prefer to leave them until they are put in the cellar when I place the colony having the least stores of honey at the bottom and the heavier ones on top with only a sheet of paper between having a small hole in the center perhaps one inch in diameter. In spring all can be shook into one hive and treated as one colony. If queens are of equal value, I do not trouble to look for either but let the bees decide for themselves which shall live.

Spring Management

When bees are moved from cellar to summer stands, care should be taken to move them as quietly as possible and assist them in housecleaning by removing the bottom board (which should be loose) and brushing out all dead bees and other waste

material between the combs as far as practical. If care is taken one may not need to use any smoke in this task.

It is best to place bees on the same stands that they occupied the summer before, though many bee-keepers do not take this trouble.

As soon as possible after the bees have had a good cleansing flight, if in single wall hives, they should be given some protection. This may be done by wrapping old papers about them being sure to have several thicknesses over the top, under the cover. If no more than he top is thus protected, it pays. Any protection from our inclement spring weather, that helps to conserve the heat of the colony, pays. Especially do the worker colonies need this protection.

In about a week after bees have been placed on summer stands, they should be looked over carefully to ascertain their condition. One must have a warm day for this, as the hives should be opened and the brood may be chilled. I like to have the temperature at seventy degrees but sometims the work has to be done at a lower temperature. If no brood or eggs are present, the colony is presumably queenless, and should be united with a strong colony, unless a queen can be supplied within a few days.

The bees of weak colonies should be crowded together onto what combs they can cover by using dummy board in place of comb and filling space with some good packing material such as dry leaves, paper, old cloth or excelsior. As the weather gets warmer and more room is needed the combs must be replaced. It is better to have all colonies in the yard of nearly equal strength at the opening of the surplus flow and the bee-keeper should work to this end. When the weather is warm and settled, the weaker colonies may be greatly helped by giving them a frame of hatching brood and bees from the strong colonies, being certain that the queen is not removed. If a little smoke is used and the colonies disturbed as little as possible, no fighting will result. All grass and weeds should be kept down in front of the entrance of the hives throughout the season. A bottom board projecting in front of the hive a few inches to form an alighting place, helps. A short board resting on the ground and against the bottom board at an angle looks unsightly

but it is a big help to the heavy laden bees that otherwise drop in the grass or on the ground. Hives should rest on stands off from the ground about one foot.

In a climate such as we have in Maine, the bee-keeper should endeavor from the start to build up his colonies from the opening of spring as rapidly as possible. Bees must be supplied with plenty of stores to keep up brood rearing, unless nectar is being brought in or there are plenty of stores in the hive. Only a limited number of eggs will be laid by the queen unless the bee-keeper supplies this need.

Full combs of honey are the ideal food for this purpose but, unless saved carefully from the previous season, are not usually available except when spared from other colonies. Granulated sugar dissolved in an equal volume of water and fed within the hive in some sort of feeder (see Figs. 14 and 15) is the next best source. This should be fed to the bees warm, and preferably at night. Some feed what they think will be required at one time while others practice feeding a small quantity each day, called

Fig. 14.—Simplicity feeder, used for stimulative feeding

Fig. 15.—The Miller feeder, for feeding bees liquid honey or syrup

stimulative feeding. The novice will be on the safe side to feed all at one time, that is, on successive days until the desired amount has been fed. Caution should be used not to feed more

than will be used by the bees in brood rearing. If a large quantity is fed, it might later be stored in the supers and sold. Under the pure food laws, honey is defined as "The nectar of flowers gathered by the bees and stored in their combs." The chemist can distinguish between cane and beet sugar and the nectar of flowers, and the bee-keeper would thus become liable to prosecution even though he intended no violation of the law.

The bee-keeper may further help the bees by supplying artificial pollen, if hives are out of doors, sometime before natural pollen is available. Rye or wheat flour mixed with bran or some other coarse material makes a substitute that the bees will use freely until the natural pollen can be found.

Bees also use a large amount of water, and if this is supplied at all times in some sheltered spot where it is warm, it will save the lives of many.

The bees which live through the winter die very rapidly in spring, especially in a changeable climate like Maine, living only long enough for the young bees to mature and take their places. With bad wintering, they dwindle so rapidly that the colony is often lost outright or only succeeds in building up to full strength, and the honey crop is lost.

Nothing is gained by uniting very weak colonies early in the spring. They had better be united with strong colonies, or tucked in snug and left until the weather is warm and settled, and both are gaining. At the opening of the surplus harvest, they may be united with profit if honey is the object sought, or left alone if increase is desired. Let it be borne in mind that the bees that gather the surplus crop must be about forty days old from the egg when the flow opens, if we are to secure the best results. The young worker bee emerges from the cell at twenty-one days, and for the next three weeks performs the work of the hive, acting as nurse bee, preparing the food, feeding the young larva, sealing them in their cells, building combs, and, at times, receiving the nectar from the field bees and storing it in the combs. They take daily flights when the weather is suitable marking their location carefully, and going farther as they grow stronger, until about the fortieth day from the egg when they become field workers. In the rush of the season, they wear themselves out in about one month. Were it not for

the fact that the queen was laying from several hundred to two thousand eggs a day at this time, the colony would soon be depleted.

Securing the Honey Crop

If bees have wintered well, and have been properly cared for, they should be strong and ready for the supers by the time white clover begins to bloom. Some seasons, the supers would need to be put on earlier. There is no fixed rule or date, all depends on the season, the strength of the colony and the nectar coming in.

The super is the arrangement in which the surplus honey is secured whether as section honey, chunk, or extracted honey. When the colony has become so populous that they are crowded in between all the combs and new wax can be seen along the

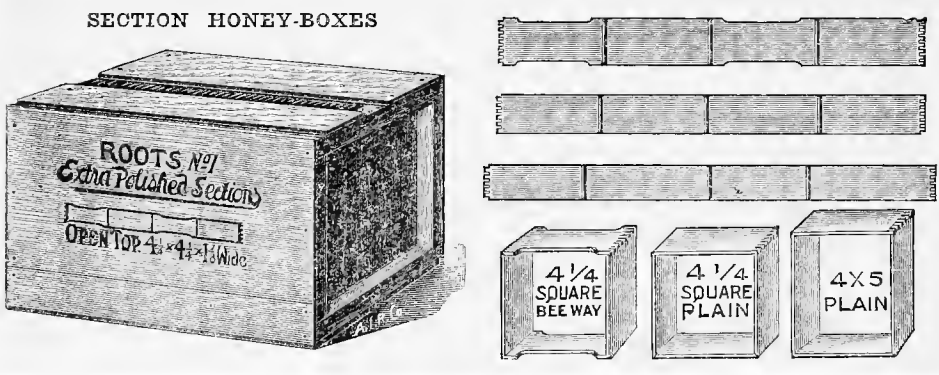

SECTION HONEY-BOXES
ROOTS No1
Extra Polished Sections
OPEN TOP 4 1/4 x 4 1/4 x 1 7/8 Wide
4 1/4 SQUARE BEE WAY
4 1/4 SQUARE PLAIN
4X5 PLAIN

Fig. 16.—Standard bee-way section. b. Plain sections in flat. c. The same put together ready for the foundation

top bars of brood frames, it is usually time for the supers to be put on. As a rule in this State, it is not far from the first bloom of clover. Everything should be in readiness by this time, so that supers may be put on as fast as needed.

Sections in which comb honey is usually secured, come in boxes containing five hundred in the flat (see Fig. 16). The comb foundation is put up in boxes containing one to five pounds. The different grades are known as heavy, medium and light brood, and thin and extra thin supers.

For the sections which are easily set up even by the novice, the foundation must be cut up in pieces of the desired size, and fastened to the top of the section by a machine used for this purpose called a foundation fastener. There are several styles of which the daisy is the most popular. A cheaper one consists of two blocks of wood, and the wax is fastened, while moderately warm by pressure. If only one or two colonies are kept, the wax may be fastened by warming a thin table knife to the right temperature and running along the edge of the wax so as to melt it and stick it securely to the wood. The pieces of foundation are then straightened up so as to hang penpendicularly when in the hive. Care should be used to get this in the center of the section. Some bee-keepers use full pieces in sections, some use only one inch strips as starters, others use both top and bottom starters, while still others use a V shaped piece. With a little experience each one will be able to decide for themselves what they like best.

On general principles, it is a good investment to use foundations liberally in the sections, or extraction frames. If chunk honey is to be produced, the extracting frames must not have the foundation wired. If a good flow is on, the bees will need a second super as soon as the first one is well under way. The second one may be placed on top of the first one until the bees have begun work in it when the position of the super may be reversed. Other supers may be added as required keeping the finished or nearly completed one on top and the empty one next to the brood chamber. This requires care, good judgment and some knowledge of the pasturage, so that the close of the season does not find the bee-keeper with a lot of unfinished sections on hand which are not marketable except at reduced prices.

If extracted honey is to be produced, one does not have to be quite so careful in this respect.

The producers of comb honey should have supers, sections and foundations on hand to take care of any possible flow. It is better to carry over some unused material to another season, than to have honey lost because of lack of these things.

One should decide as soon as possible whether they wish to produce extracted, comb or chunk honey, or both comb and extracted.

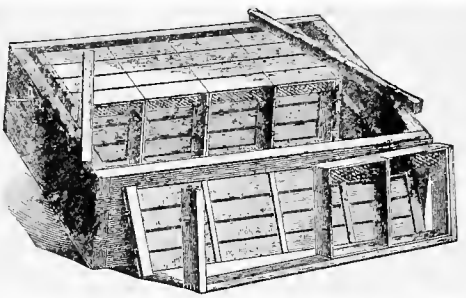


Fig. 17.—Comb honey super taking plain sections and fences

More extracted honey can be secured with the same number of colonies of bees. When once the combs are built they can be used for many years while, if comb or chunk honey is produced, the comb is sold with the honey.

Chunk honey is usually produced in half depth extracting frames. If one can dispose of this in a local market, the

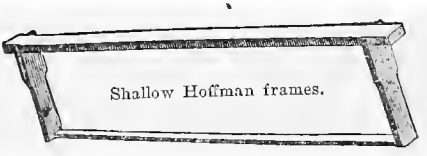


Fig. 18.—Used in extracting super or for choice honey production

cost of this method is small. It is a good method for the busy man who has little time to devote to the bees, there will be less tendency to swarming and more honey can be produced. For home use or a neighborhood market much may be said in its favor. The honey may be sold in the frames or cut from the frames and put in tin pails, which may be secured from supply dealers. For the fruit grower who desires bees in the orchard for the purpose of pollination and does not care to spend much time with them, this method may appeal to him.

Plenty of supers should be provided either half or full depth. The full depth means less care and attention. These are simply extra hive bodies filled with brood frames, starters or full sheets of foundation. If one desires to extract the honey from these frames, heavier foundations will need to be used and the foundation wired in the frames.

If the bees are given extra bodies or supers as needed, swarming may be kept down to a point where the losses or trouble will be small.

It would be best to have clipped queens where this method is used and to requeen with young, vigorous queens at the close of each season.

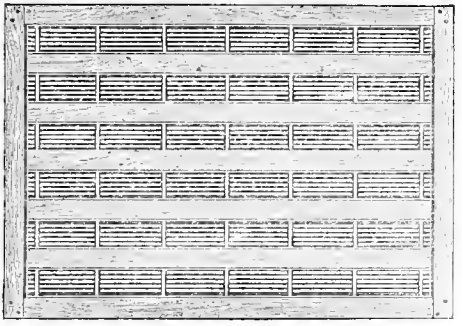


Fig. 19.—Queen excluder, used to confine the queen in the brood chamber in the production of extracted honey

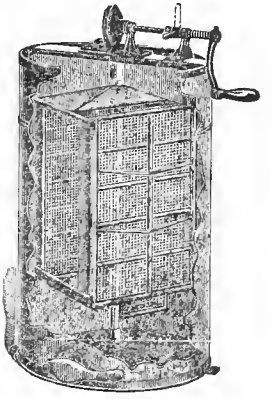


Fig. 20.—Honey extractor, used to remove honey from the combs without destroying them

Extracted Honey

If extracted honey is to be produced one must have an extractor (see Fig. 20).

These are made in different sizes, either hand or power. There must also be cans, labels, carriers, jars or pails for marketing the honey. These add cost to the price of the honey when

it finally reaches the consumer. The small glass container is the most expensive way. More pounds of honey can be produced by this method, practically double the quantity that can be produced in one pound sections.

One may have enough supers so that they need not extract until the close of the harvest, or the honey may be removed from the combs as fast as it is ripened and capped by the bees. If honey is extracted before this and put on the market without being artificially ripened, the results will be unsatisfactory to both consumer and producer.

The room in which the extracting is done will need to be kept at a temperature of about 80 degrees F., for some time before extracting, so the honey may be thoroughly warmed, or trouble will follow in getting it from the combs without damage to the combs.

Marketing Honey

While there is not as much honey consumed as there would be if people realized its food value, or were accustomed to its use, still the demand is usually greater than the supply.

The bee-keeper or would be bee-keeper should carefully consider the opportunities of his home market,—if there is already a demand for honey, or if, with a reasonable effort, a demand could be created. If honey can be disposed of in the locality where it is produced, where it may be delivered to the dealer or consumer direct, it is a great advantage over the producer who must ship to a distant market and deal with those with whom he has never met. Until the express companies are compelled by a strong law to handle comb honey more carefully, this means of conveyance between producer and consumer will never be satisfactory.

Parcel post is comparatively a new mode and almost untried. Small parcels less than eleven pounds have been shipped five hundred miles with safety but at present there are too many cases of breakage to justify dependence. I look for great improvements in the parcel post system when times are again normal. From my own experience freight shipments have been the safest. Eight or ten cases of comb honey are packed carefully in a carrier (see Fig. 21) provided with handles which has a layer of hay, straw or similar material at the bottom, of

sufficient depth to make a safe cushion to prevent breakage. This makes a package weighing three hundred to three hundred and fifty pounds which is too heavy to be thrown about.

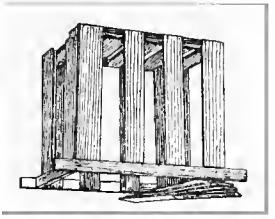


Fig. 21.—Carriers made to take eight or ten cases with a cushion of hay, straw, or excelsior at bottom

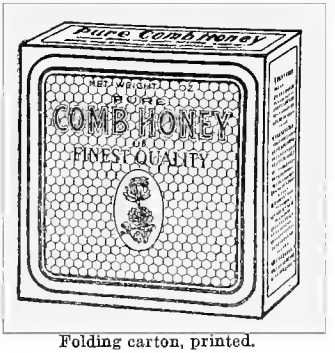
Regardless of how honey is shipped, it should always be plainly marked with printed cards telling the contents, and asking that care be exercised.

For comb honey, or extracted in glass, more care must be taken in packing than for extracted in tin cans. Even this must be properly packed and crated to insure delivery in safe condition. A card for comb honey should be similar to the following:

COMB HONEY
FRAGILE
FOR.....
.....
DESTINATION.....
HANDLE WITH CARE
DO NOT DROP IT
HAUL ONLY ON VEHICLES HAVING SPRINGS
KEEP DRY KEEP WARM

Cartons are valuable in handling comb honey (see Figs. 22 and 23). They protect it from dust, dirt and flies, lessen greatly the liability of breakage in transit and appeal to both the dealer

and consumer. Comb honey should be eaten just as it reaches the home of the consumer. Every effort should be made on the part of the producer to see that it is kept pure and clean.



Folding carton, printed.

Fig. 22.—Carton to hold one section of honey

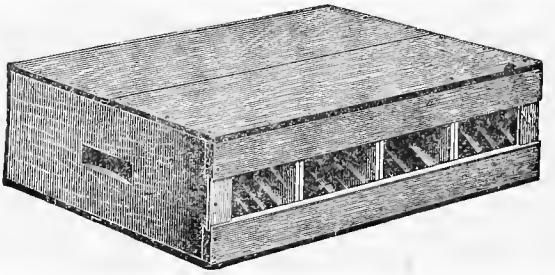


Fig. 23.—Shipping case made to hold 24 sections. May be used for shipping honey in cartons

Care of Honey

From the time honey is removed from the hives, care must be taken by those who handle it, or much of its fine flavor will be lost. To the producer of honey falls this first care, and, if he neglects this important duty, no subsequent care can remedy the matter. When removed from the hives, it should be placed in a room that is warm and dry, preferably a sunny room. As the weather reaches the freezing point, it is better that some artificial heat be provided but it is important that the tempera-

ture does not vary greatly. Honey gathered during a hot, dry season keeps much longer than if gathered during damp or cool weather. All pure honey will become solid in time if kept at a low temperature. I am quite certain that in a temperature that varies greatly from cold to heat, granulation takes place almost as quickly as in a room which is cold all the time. The room should be a reasonably clean one and one in which no bad odors are present. It should be so piled that dust and flies cannot get to it.

When honey is sold, if to dealers, they should be instructed as to its care. As a rule the consumer buys in such small quantities that it is used before much harm can come to it.

It is important however that the consumer does not place honey in the cellar for many days before it is used, because honey that has been kept in perfect condition may lose much of its rich flavor even by a few days in such places. Keep warm and dry until ready for use. A kitchen cupboard, if not too near the range, is all right. By placing the honey in the refrigerator a few hours before using, it is improved for most people.

Removing Honey From the Hive

When one only keeps a few colonies, it is a good plan to leave the surplus honey on the hives until the close of the season. If a completed super is taken off and an empty one put in its place, the bees seem to resent it and do not readily enter the empty one. By raising the nearly completed super and placing the empty one under it, work begins without delay and continues in both supers. In a good season, if too many supers have to be added, the top ones may be removed.

To remove the supers, lift off, put an escape board underneath and put supers back in place. In twenty-four to thirty-

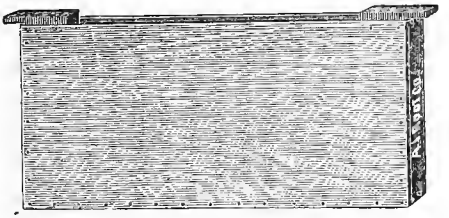


Fig. 24.—Doolittle division-board feeder, to be hung in place of frames

six hours the supers will ordinarily be free of bees. In some cases, there may be brood in the supers, especially drone brood, and the brood will continue to hatch and some worker bees will instinctively remain with the brood. In this, as in all operations with bees, it is better to use a little smoke.

Where many colonies are kept, eight or ten supers may be piled up with an escape underneath and another escape (see Fig. 25) fixed in the cover. In this way one can get along with less escape boards. Where one has no escapes, the supers may

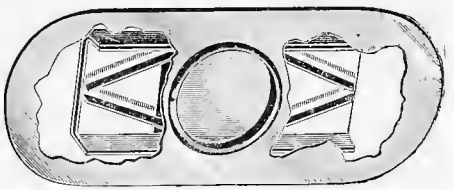


Fig. 25.—Porter bee escape, used in escape boards

be tiered up in the same manner over a strong colony, being very careful that no cracks are left so that bees can enter or leave except through the entrance. Some very cool morning, the top supers may be taken off free or nearly free of bees. If weather is warm this method will not work out. Supers from different colonies may be tiered in this way where a little smoke is used without fighting, as the bees are confused and all pass, a few at a time, down through the escape. On flying out, all but the very young bees return to their own colonies. The bottom super of the pile should be from the colony on which the supers are placed and should be full of bees.

If only a few colonies are kept, a bee tight box could be used by making a two inch hole at top over which fix a cone made of wire screen with a hole at top just large enough for a bee to pass out.

The cost of a good escape board is so small that one cannot really afford to get along without them and, with good care, they will last a lifetime.

Danger to Bees From Spraying

There is so little spraying done at the present time, while fruit trees are in bloom, that it may not be necessary to sound a warning against this practice.

I would hesitate to spray fruit trees while in bloom for fear of injury to the tender functional organs of the blossom even if there was no danger to the bees.

Nearly all fruit-growers of today appreciate the value of bees in orchards and the important part they play in the better pollination of the blossoms and, consequently, increased quantity and quality of fruit. Spraying just before the blossoms open and after the petals have fallen serves every purpose without danger of killing the bees or injuring them. Where it becomes necessary to use a sweetened spray, every precaution should be taken to guard against killing the bees.

They might be kept from poison spray by feeding a syrup made of one part sugar to two parts water, or honey would be even better. If fed in the open, one of sugar or honey to three of water might serve the purpose. It would be better fed in the open only for the liability of feeding other bees but I would feed in an opposite direction from where the poison is being used. It would help if bees were at work on prepared feed before poison spray was applied.

Value of Honey as a Food

Few people know or appreciate the value of honey as a food for human use. Few physicians have given the matter any thought, and have little knowledge as to its real value in the sick room. I have never talked with a physician who has learned of its value who is not a warm advocate of its merit.

Honey is regarded by far too many people as a luxury. I would estimate that not over five per cent of the homes in this State use honey as a regular article of diet as they do sugar, butter, eggs or fruit. All of these are necessary articles of diet. Not enough uncooked fruit is used, but could honey replace much of the cane and beet sugar used, it would be far better for the health of those who consume it.

The craving of sweets by nearly all normal children is natural and should be gratified in reasonable quantities. It is far better for their health that they have honey, natures pure wholesome sweet, than sugar and candy. It is not simply a sweet, it is a food. Fourteen ounces of honey, about the net quantity purchased when a section of honey is bought, is equal in food value to one and a half pounds of beef steak, eleven and one-fifth ounces of cream cheese, seventeen ounces of walnuts, two quarts of ordinary milk, twenty eggs or nearly two pounds of boneless codfish.

When compared with fruit, fourteen ounces of honey has a nearly equal value of ten bananas or sixteen oranges of average size. Hon. W. B. Barney of the Iowa food and dairy department, is responsible for these comparisons.

Dr. C. C. Miller of Marenge, Ill., says, " It would be greatly for the health of the present generation, if honey could be at least partially restored to its former place as a common article of diet. The almost universal craving for sweets shows a real need of the system in that direction but the excessive use of sugar brings in its train a long list of ills.

" Now in the wonderful laboratory of the bee, there is found a sweet that needs no further digestion, having been prepared fully by those wonderful chemists, the bees, for prompt assimilation without taxing the stomach or kidneys."

Dr. Miller at eighty-seven years of age, healthy and vigorous for his years, eats honey every day in place of sugar, and believes that it has contributed in part to his health and length of days.

Prof. A. J. Cook, formerly State Horticultural Commissioner for the state of California said, " Physicians may be correct in asserting that the large consumption of cane or beet sugar by the average Twentieth Century Man is harmful to the great eliminators, the kidneys, and is a menace to the health and long life.

" There can be no doubt that in eating honey our digestive machinery is saved work that it would have to perform if we ate cane sugar, and in case it is overtaxed and feeble, this may be just the respite that will save it from a breakdown."

When sugar is eaten it cannot be assimilated until it has been changed into grape sugar. Very often the stomach fails to do this work properly and the kidneys are taxed beyond their strength to remove this excess sugar from the system. With honey it is entirely different as it is already in the form of grape sugar and is assimilated without any effort on the part of the stomach and thus the kidneys and other organs are relieved from any extra work.

Honey was a common article of food three thousand years before the first sugar refinery was built. It is used in medicines and is the base of many of the cough remedies and salves. It may be used in many ways, in place of sugar on rice, oatmeal or other cereals and breakfast foods. It is both appetizing and nourishing on baked apples. It may be used in cooking or in making candy. As a warm drink for children or those who cannot use tea or coffee, it is a substitute of value. Stir one or more teaspoonfuls of extracted honey in a cup of moderately hot water and add cream or milk as desired. In the years just previous to 1915 about 80 pounds of sugar on an average was consumed annually by every man, woman and chlid in the United States. We know that many did not get this amount, consequently some must have eaten much more.

The average consumption of sugar in my home in normal times has been about three pounds per person a month, while the amount of honey consumed is about four pounds per person. No account is made of extra help or visitors, which would reduce the individual quantity. In this one thing at least we practice what we preach,—

"Eat thou honey because it is good," Prov. 24-13.

Every housekeeper should obtain and carefully read Farmer's Bulletin No. 653, "Honey and its Uses in the Home." This can be secured by addressing the Secretary of Agriculture, Washington, D. C.

Requeening and Introducing Queens

When an old queen begins to fail and her vitality is exhausted to a certain point, the bees often replace her by rearing several young queens in the same manner as when swarming. In fact, this most often occurs during the swarming season. A new

swarm may result when the first young queen emerges from her cell. Much depends on the season of the year and the strength of colony.

It is better if the bee-keeper attends to requeening his yard each autumn or late summer at the close of the honey flow, replacing all poor queens and all queens which have passed their second season, unless they are known to have sufficient merit to warrant giving them another season. Queens may be purchased from any breeders of queens, in different parts of the country. Their advertisements may be found in any number of "The Bee Journals," or they can be reared in the home yard with a little experience and study. These should be reared from the best stock in the yard and careful selection practiced. If queens are purchased and the instructions for introducing, which accompany each queen, is carefully followed, there will be no trouble as a rule, though occasionally a queen may be lost.

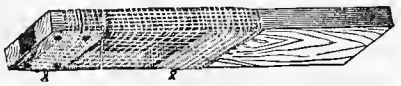


Fig. 26.—Miller queen introducing cage

When weather is cold, a safe way is to remove a few frames of hatching brood from the colony to be requeened, brush all bees off the combs, place combs in an upper story, find and destroy the old queen, cover frames with a wire cloth and set upper story over with brood frames in center, tucking in snug and warm, after the new queen has been released on the comb of brood in the upper story. In three or four days, a hole should be made through center of screen disturbing the bees as little as possible, and they will unite quietly. If weather is warm enough so that the brood will not chill, the combs of brood may be placed in an extra hive body, closing it so that no bees can escape but letting in air enough so that the bees will not smother and queen be released. On the third or fourth day the hive entrance should be opened and bees allowed to fly out.

Later combs or brood, or brood and young bees may be added until colony has attained normal strength. Empty combs or sheets of foundation may also be given. If bees are to be treated in this way, care should be taken to gauge the size of the entrance so as to prevent robbing.

Artificial increase may be made in this way, or the colony may be divided, as the swarming season approaches, into two or three parts and allowed to raise their own queens being sure that each nucleus has bees in all stages,—at least eggs and young larva should be present. The general opinion is that the queens produced in nuclei are not as satisfactory as those raised in full colonies.

The following is a copy of directions for introducing queens, which will be found on the reverse side of address cards tacked on all queen cages sent through the mails:

"Before giving this queen to the colony be sure that it is queenless. A stock without a queen from twelve to sixteen days—long enough so it may have one or more virgins—may not accept a new queen, and bees that have nearly started queen cells sometimes refuse to accept a new queen. It is usually best, therefore, not to remove the old queen until the time of introducing the new one, but if several days have elapsed, be sure to remove every queen cell. To introduce, place the cage on top or between frames; if on top put the wire cloth down next to the bees. The bees should gnaw away the pasteboard, eat out the candy left in the cage, and release the queen, but sometimes they fail to gnaw the pasteboard. If they fail to do so in twenty-four hours tear the pasteboard away and let the bees out to eat candy. If the weather is cold, set the cage right over the cluster of bees. Ordinarily, it is not best to open the hive soon after introducing the queen, for the disturbance may cause the bees to ball her. Should queen and attendants arrive feeble, or daubed up, release at once among bees. If they ball her after they clean her, return her to cage and introduce her as explained. If she arrives dead, notify us and we will replace. If your bees are or have been robbing, you will not succeed in introducing. N. B.—Queens just from the mails usually look small and dark. After laying a few days they will improve."

Wintering

The biggest problem for the bee-keeper in Maine is to carry the colonies safely through the winter. There are other problems to solve which mean success or failure, but they are minor ones more within the control of the bee-keeper.

A confinement of three months without flight is considered a long, hard one in most parts of the country. In northern Maine we cannot hope for less than five months and it sometimes means six. In the southern or central part of the State, where outdoor wintering is practiced, in mild winters bees may get suitable weather for one or more flights.

One must choose for himself which method seems best adapted to his locality and condition. If there is a suitable cellar under the dwelling house which can be used, the expense of this method of wintering will be small. The quiet part of the cellar which can be well ventilated and kept dark at all times during the confinement of the bees and in which the temperature can be evenly maintained between forty and fifty degrees F., should be selected. It is best that the room be rat and mouse proof as even one or two of these pests will worry a colony to the point where they will be useless for honey production during the honey season, if not killed outright. I prefer a dry cellar, although some claim good results are obtained from damp cellars.

Care should be taken that hives, when placed in the cellar, do not come in contact with posts which support the floors above, as the constant jar will be a serious disturbance.

I am satisfied that pure air contributes largely towards successful wintering. This must be arranged for without lowering the temperature too much. If a chimney reaches to the bottom of the cellar, an opening can be made near the bottom which will draw out the foul air, and the intake can be located so it will not come directly on the hives. As the weather grows warmer at the approach of spring a larger quantity of fresh air will be needed to keep the bees quiet. Hives should not be closed up with a screen or in anyway, but better be raised from the bottom boards one or two inches, thus insuring a free circulation of air. It is better that the bees which die during the winter crawl outside the hive and die, and occasionally they

can be swept up and their decaying bodies will not pollute the air. It is possible to carry bees safely through the winter in an ordinary cellar without special provisions being made, but it is far better to provide as nearly ideal conditions as one's circumstances will permit. They need not be expensive.

When bees are carefully put away for winter they should not be disturbed until they are taken out in the spring, if possible to avoid it. For this reason it is best that all colonies should be provided with an abundance of stores to carry them safely throuh the winter and until the weather is warm and settled in spring.

If natural stores and honey is not present in the hives in sufficient quantities, the bees should be fed pure granulated sugar dissolved in water until each colony has not less than twenty-five pounds of stores and even forty would be better. There are different styles of feeders on the market which can be obtained through the bee supply dealers, or if one is ingenious a home arrangement can be provided.

As a substitute for honey, a syrup made from granulated sugar is best. For spring feeding, a thin syrup even as dilute as two parts of water (volume) to one of honey may be used. Ordinarily equal parts are used. For supplying winter stores, a thick syrup is better,—two to two and one-half parts of sugar to one of water. To prevent granulation a teaspoonful of tartatic acid should be added to each twenty pounds of sugar while the syrup is being heated. This dissolves the sugar crystals. In making the syrup, the greatest care must be used to prevent scorching. It should be as clear as if made with cold water. In this State, the feeding should be done not later than the latter part of August. It would be better to feed in September than for bees to go into winter quarters short of stores. If feeding is done early while the weather is warm, the honey is properly ripened and sealed over. The presence of much unsealed honey or syrup in the combs is often fatal to the bees in a long winter confinement.

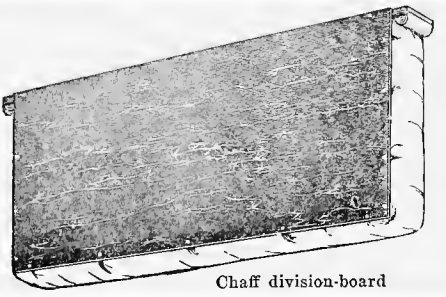
With good stores of food and right conditions, bees do not void the feces while in confinement, but on flying out of the hive. Some dark honeys or honey-dew leave much waste in the process of digestion. Bees cannot stand a long confinement

on it without dysentery results and, consequently, bad wintering and spring dwindling if the colony is not lost outright.

There are many ways in which one might keep the bees through a long Maine winter, but we have only space to consider the two real methods applicable to our conditions, namely: Outdoor or indoor wintering.

If bees are to be wintered outdoors and above ground, the bee-keeper should so decide as early in his career as possible. Hives may be purchased which are fairly safe in which to winter bees on their summer stands, but for our Maine climate, I feel that the single walled hives provided with proper outer case and proper packing, are safer.

There are several methods of packing. One is to place four colonies together in a group, two facing east and two west. Then pack in a large case as one colony leaving space for eight inches of dry leaves or planer shavings on all sides with foot on top. Chaff is sometimes used but it is not quite as satisfactory since it holds moisture and is apt to contain grain which intices mice. Bees and mice do not winter well together.



Chaff division-board

Fig. 27

An entrance should be provided through the packing to open air three-eighths of an inch in depth to six or eight inches in width. A strong colony would be better off with a large opening while a weaker one might be safe with less than six inches. In extreme cold weather the entrance could be nearly closed and opened when weather moderates unless snow covers the hives. Some bottom protection should be given. This could consist of some four inches of the same material as used for sides and top, or it may be several thicknesses of good paper

between floor and bottom board. Packing material is better. The whole must be roofed over so to keep out all rain and snow. The group should also be protected from heavy winds by a board fence, evergreen boughs, trees or some other convenient way.

Colonies should be packed in much the same manner in a row all facing south or each individual colony may be packed on its summer stand, which is possibly a little more expensive for material and labor.

I consider the individual system or packing in rows better for Maine conditions. If bees are moved and placed together as in the group system and later get a day suitable for flight, there is almost sure to be a confusion and loss of bees. Packing should be done early in season and left until the weather is settled and warm in spring and the packing is no further protection against cold days and nights. If the group system, known as the quadruple case is to be adopted, a platform should be built of some lumber or other material which will stand the weather, eight inches or a foot off the ground, and the four colonies located there permanently. When time to pack, they need be moved only a short distance, just snuggled up together with no confusing results, as the entrances are changed only a short distance. The four hives should be wrapped wtih paper as one to prevent air currents. When unpacked, the packing material should be dried and carefully saved for future use.

WHEN TO PUT BEES IN THE CELLAR

There is no definite date as to the right time to put bees in the cellar. The day after they have had the last flight of the season, they should be put in. There are not many days in November in this State in which bees can fly freely, but there are usually a few in which they may have a good flight. When they have had that flight they should be put in unless it is the very first of the month and the prospects are that they may have several days of good weather ahead. The first real cool day following a warm one in which the bees have been flying freely, put them in the cellar.

PREPARATION FOR WINTER

Whether wintered in cellar or outdoors, the bees should be put in condition for this trying ordeal earlier in the season. One of the most important things in successful wintering is to have plenty of young bees in the colony. If no nectar is coming in, the queen stops laying early in the season and the best results are not obtained. To remedy this, we may feed thin honey or sugar syrup in small quantities each day, or every few days, until the latter part of September. This will insure a good force of young bees for winter. We should also see that all failing queens are replaced with young queens of stock which have made satisfactory records in the sections. This is the final test of a good queen, one whose bees give results in the supers. Where single walled hives are used, it helps greatly to cover the brood frames with several thicknesses of paper with the coming of the first cold days of fall. This helps to conserve the warmth of the colony and to keep up brood rearing and tends to decrease the consumption of honey.

TIME TO TAKE BEES FROM THE CELLAR

The time when cellar wintered bees should be placed in the open varies with the seasons. As a rule, if the bees are quiet and have wintered well, they should not be taken out until near the time when they can find natural pollen. If the spring is warm and sunny, they had better go to summer location as soon as the snow is gone and weather seems settled. Select for this work a day that bids fair to be warm and sunny. A cloudy day, if warm, is all right but not as dependable.

The temperature ought to be nearly sixty degrees F., and seventy is even better. Begin in the morning as soon as warm enough for bees to fly, usually about nine or ten o'clock. If one could be certain of the day they could be taken out sooner. Where a large number of colonies are to be taken out, one must start quite early as it is best to have all go out the same day if possible. If a windy day, or a breeze is blowing, bees are apt to drift to quite an extent. In some cases colonies to windward may have their numbers depleted to a point where they are very weak, while colonies on the opposite side of the yard may

be very strong. There is always the tendency of bees of a weak colony to enter the hives of a strong colony during the first spring flight. If location of hives has some distinguishing marks and the distance apart is five feet or more, no serious results will follow.

Robbing

One of the things that the bee-keeper should carefully guard against is robbing. A strong colony will rob a weak one in the same yard, or they may go a distance of some miles and do the same thing. When once a yard becomes thoroughly started at robbing it is a serious matter. Aside from the bad effects on colonies robbed, the bees usually become very cross and are apt to sting any living thing in sight at some little distance from the disturbance. They do not settle down as a rule, until another good flow of nectar and are apt to make trouble throughout the season.

If only one colony is robbed, unless a valuable one, and the affair is well under way, they should be allowed to complete the job, taking care that all colonies in the yard have their entrance closed enough so they can easily defend themselves against robbers particularly those near the robbed ones. If robbing has not progressed far, it may be stopped by closing the hive entirely for twenty-four hours, providing ventilation, and when opened, having entrance very small for a time.

Robbing usually starts through someone's carelessness in leaving a hive open or combs outside the hive. Supers may have been carelessly tiered up when taken off so as to allow bees to enter. The same thing might happen in adjusting the escape board, or by dropping bits of comb containing honey about the yard. Prevention is the best remedy.

When nectar is coming in freely, there is not so much danger but in times of dearth it takes but little to start robbing. Hives should not be opened any more than is absolutely necessary when no nectar is coming in and then should not be kept open longer than can be helped. If robbers start to make trouble, close the hive quickly and narrow the entrance so that only a few can pass at a time.

There is another sort of robbing that one has to meet in other ways. A double barrel shotgun is a fairly good remedy for this.

Bee Diseases and Enemies.

Among the diseases with which the bee-keeper has to contend, the most serious is foul brood. There are two classifications of this known as European and American foul brood.

It is an infectious disease which destroys the brood and eventually the colony. It is transmitted to healthy colonies by bees robbing or by feeding honey from unknown sources, viz.: from diseased colonies, by hiving new swarms in hives which have contained foul brood and in other ways. The remedy is eternal vigilance to prevent infection and if it gets into the yard, prompt treatment.

Many states have foul brood laws and inspection and it is hoped that Maine soon will have.

Every bee-keeper should have Farmers' Bulletin 442, "Treatment of Bee Diseases," which will be sent free on application to the Secretary of Agriculture, Washington, D. C.

Italian bees are said to be more resistant to Foul Brood than our common black bees and also to defend themselves better from the bee moths.

The principle enemies of the bees are, the bee moths, the larger wax moths and the lesser wax moths. The moth gains an entrance to weak colonies and deposits her eggs, where they hatch and the larva does the damage. They burrow through the combs constructing tunnels of silk as they go and the combs are worthless if much progress is made. If discovered in time the combs may be rid of larva and silk by removing the greater part of both with some sharp pointed instrument or stick, and the combs given to a strong colony. To guard against the moth, have strong colonies if possible. Weak ones should have entrance narrow to correspond to the strength of colony. Get rid of old hives which are decayed and have new ones which are tight. All empty hives should be carefully closed so that no moths can enter. If combs, which are of little or no value become infected, melt them at once and save wax. Good combs are often kept in a tight airy room and hung in racks about an inch apart.

If combs are clean and free from pollen and granulated honey, they are rarely attacked. All empty hives and combs should be looked over often through warm weather and, if moths and larva are found, they may be fumigated. Tier up several hives and on the top bar of the upper one place a shallow dish or saucer into which pour bisulphide of carbon. The gas caused by the evaporation of the liquid is heavier than air and settles down through the combs.

Extreme care must be taken that the fumes do not reach a flame as the gas is highly inflammable. As the eggs are not killed by the fumes, the process should be repeated every two or three weeks in warm weather. Sulphur fumes may be used in much the same way, except that one would need to have a tight room or box in which combs or hives could be piled. An iron kettle holding live coals may be used on which sulphur is thrown. In either method, care must be used that the fumes are not inhaled, or a fire started.

Rats and mice do damage in winter by entering hives and destroying combs and causing the loss of colonies.

The King bird is accused of feeding on bees and doubtless does to some extent but I am inclined to believe the number of bees taken is not serious, unless birds are present in large numbers. I am of the opinion that drones are more often picked up than workers. Of course, if a queen is taken, it is quite a loss. I do not like to kill birds until quite sure they are doing more harm than good. "Be sure you are right then go ahead," is a safe rule in this case. The Purple Martin has also been accused of the same crime, but I think unjustly so.

Toads are said to feed on bees but I think the harm done by them is small, especially where hives are well off the ground.

Skunks are often seen about bee hives, but as mice like to harbor under and about the stands, and also numerous grubs and bugs on which they feed, I have never considered that they do much harm.

Rendering Wax

Where one has only a few old combs or a little waste to render into wax and does not feel that they can afford a wax extractor (see Fig. 28) they may save the greater part of the

wax in them by crumbling them quite fine during cold weather and putting to soak in cold water twenty hours or more before rendering. All clean combs should be sorted and melted sepa-

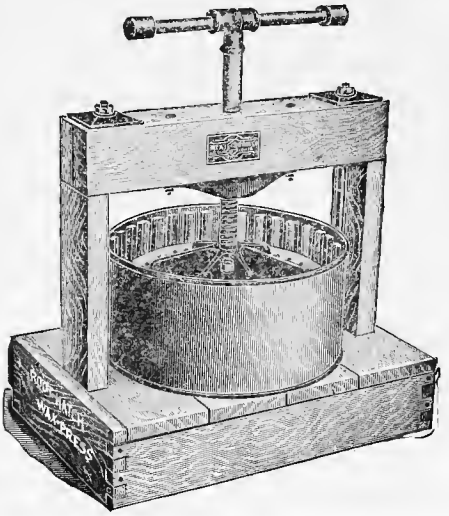


Fig. 28.—Hatch Wax Press for getting wax out of old combs

rately. An old wash boiler or kettle may be used in which the combs may be melted and boiled a short time, being careful that the mass does not boil over. Prepare a strong burlap sack by sewing in a stick about two feet longer than the sack is wide with another at the top leaving the sack open. Fill a tub one-third full of warm water over which hold the sack and into it dip the melted combs, being careful not to spill any outside. A helper will be needed. When the bag is two-thirds full, each taking a stick, by twisting in opposite directions, can force out most of the wax. When through rendering, the tub should be set in a warm place to cool slowly. The wax can then be removed and the sediment scraped from the bottom, remelted in hot water and dipped off into molds to cool. Any dealer in bee-keepers supplies will quote prices and there is always a market for it.

Conclusion

The little things often neglected with the bees mean quite a decided loss in time. In removing the supers and in other ways, bits of wax may be saved with little trouble and at the close of the season or when convenient, can be rendered into salable condition. Many supers will have quite a bit of wax on the bottom called burr combs. A box should be kept handy for this purpose into which the bits of wax may be scraped. These may be set on the stove and hot water poured on them, just enough to melt and not burn. As there is often quite a bit of honey in these, the water is bound to be very sweet, and, if too much is not used may be given as a stimulative feed after it has cooled so that the wax may be removed. All old combs which has been removed from hives, drone comb and bits of comb should be saved until sufficient quantity accumulates to be rendered.

Every little help that we may give the bees, pays in honey which means dollars.

Keeping down grass in the yard, destroying ant hills, adjusting the entrance to the size of the colony, providing ventilation at the right time, protecting colonies by wrapping with some material during the cold days and nights of spring, are some of the things that count when the returns for the season are all in.

THE HONEY FLORA OF MAINE

By John H. Lovell, Waldoboro, Maine

There are in Maine, including herbs, trees and shrubs, not far from 1500 flowering plants. Only a small part of these are valuable to the bee-keeper. Many are rare, others yield little or no nectar, and still others are adapted to bumblebees, butterflies and moths. The northern part of the State, especially in Aroostook county, is much better adapted to bee-keeping than along the coast; white and alsike clover are abundant northward and apiaries of large size occur, but in the southern section the hills are covered with glacial debris, the ground is often bare in winter, sudden extremes of temperature follow each other quickly, with the result that the flora is poor and meager and it is seldom that more than a dozen hives are found together. Unfortunately it is not profitable to cultivate any plant for honey alone. The easiest way to improve the honey flora of a locality is to sow alsike clover, which secretes nectar fully as freely as white clover. Three or four acres of clover or buckwheat are required for each hive of bees. Our climate is rather too cold for sweet clover. The plants important to the bee-keeper may be divided into groups; pollen plants, and nectar or honey plants.

Pollen Plants

Many plants are devoid of nectar and furnish only pollen, as the elms, hickories, roses and poppies. Not a few of these have been listed as honey plants as the result of careless observation, or because honey-dew has been gathered from their foliage by bees. None of the plants in the following list ever secrete floral nectar.

Alder (*Alnus incana*). This is the earliest shrub to bloom in this State. It is wind-pollinated. On a warm day honeybees resort to the flowers for pollen.

Anemone (*Anemone quinquefolia*). Bees visit the large white flowers for pollen.

Beech (*Fagus*). The small, greenish flowers are wind-pollinated. Honey-dew is sometimes found on the leaves.

Bloodroot (*Sanguinaria canadensis*). The handsome white pollen flowers open in April and May. Bees visit the flowers in large numbers and remove all the pollen.

Corn (*Zea Mays*). Bees in great numbers gather pollen from the "spindles," or staminate flower-clusters of corn. Corn is wind-pollinated and secretes no nectar. Although a bee-keeper occasionally declares that his bees gather honey from corn, there is no such thing as corn honey. In view of the great number of acres of corn, this is an important source of pollen.

Cone-trees (*Coniferae*). Fir, spruce, juniper and pine produce immense quantities of pollen. It is so resinous that I have never seen bees collect it.

Elm (*Ulmus americana*). This familiar tree produces a profusion of purple flowers in early spring. A great multitude of bees have been reported at times to gather the pollen.

Grasses (*Gramineae*). All of the grasses are wind-pollinated except a few self-pollinated species. They produce a large amount of pollen.

Hazelnut (*Corylus americana*). Valuable for pollen in early spring.

Hickory (*Carya*). Wind-pollinated flowers, which produce much pollen. Honey-dew is sometimes abundant on the leaves.

Oak (*Quercus*). Small greenish or reddish flowers, which have been incorrectly reported to yield nectar. Honey-dew is found on the foliage of many species.

Poppy (*Papayer*). Very large showy pollen flowers, from which bees gather all the pollen. Poppy honey and its narcotic effect is a myth.

Poplar (*Populus*). Aspens. Trees bloom very early and bees are said to gather the pollen. Honey-dew is sometimes found on the foliage. Wind-pollinated. These trees should be distinguished from white poplar or tulip-tree (*Liriodendron Tulipifera*).

Ragweed (*Ambrosia*). Valuable in the fall for their abundant supply of pollen. Two common species are Roman wormwood and great ragweed. The pollen is regarded as a cause of hay fever.

Roses (*Rosa*). The roses are common to both continents and rose honey would be an ideal honey, but not a single ounce of it has ever been produced. The roses yield much pollen but no nectar; bees gather the pollen. Bee-keepers often believe that bees find nectar, but careful study of the flowers shows that they secrete none.

Nectar or Honey Plants

Strictly speaking flowers yield nectar and plants producing it should be called nectar plants; but the term honey plants is so widely used that I shall continue to use it in this list, understanding by it plants which secrete nectar which the bees convert into honey. A large number of plants produce both pollen and nectar, but in Maine comparatively few yield a surplus of honey—the most important being white clover, alsike clover, fruit-bloom, raspberry, fire-weed and goldenrod.

Alfalfa (*Medicago sativa*). This forage plant so valuable in the west yields no nectar in Maine.

Aster (*Astcr*). The asters are of some value in this State, and in late fall bees may be seen frequently on the flowers. *Aster paniculatus* appears to be most important. In some localities in the middle states the ground is white with the blossoms of field asters. Pure honey white or perhaps sometimes light amber. It is gathered so late that often it may not be fully ripened.

Apple (*Pyrus Malus*). Yields a small surplus occasionally in this State. Honey of fine quality, light amber with aromatic flavor.

Basswood (*Tilia americana*). So rare in this State as to be of little importance.

Blackberry (*Rubus*). Yields little nectar in the northern states; but a surplus is reported in Georgia and California.

Boneset (*Eupatorium perfoliatum*). Visited by insects in large numbers, but not common enough to yield a surplus.

Buckwheat (*Fagopyrum esculentum*). Not extensively grown in Maine, but fields of it are cultivated in many localities. A dark purplish honey.

Button-bush (*Cephalanthus occidentalis*). Common in swamps but not important.

Canada Thistle (*Cirsium arvense*). Not very abundant in this State but more common westward. Honey light and well-flavored.

Carrot (*Daucus Carota*). Naturalized from Europe, common in fields.

Clover, White (*Trifolium repens*). A fine white honey of delicious flavor. Alsike clover (*T. hybridum*) is an equally good honey plant, honey similar. Both are abundant in Maine, especially northward. In dry seasons bees are able to gather nectar from red clover, a bumblebee flower.

Cucumber (*Cucumis sativus*). A good honey plant in the neighborhood of pickle factories. Honey with flavor of the fruit, but improves with age.

Currant (*Ribes*). The various species of currants and gooseberries, both wild and cultivated, are of some importance.

Dandelion (*Taraxicum officinale*). More valuable for pollen than nectar in this State. Honey golden yellow, thick, strong-flavored, crystallizing in a few weeks.

Goldenrod (*Solidago*). A most valuable honey plant in New England. In southern Maine never fails to give a large surplus the *main* dependence of the bee-keeper for winter stores. Honey golden yellow, fine flavored, candying with a coarse grain in a few months. *Solidago graminifolia* and *S. rugosa* are the most important species in this State.

Heartsease (*Polygonum Persicaria*). This plant so valuable in Illinois and Nebraska is of no importance in Maine; a bee is rarely seen on the flowers.

Horsechestnut (*Aesculus Hippocastanum*). Not common, bees gather both nectar and pollen. Bumblebee flowers.

Locust, Black (*Robinia Pseudo-Acacia*). Yields a surplus of white honey further south; but not abundant in Maine. Often cultivated.

Maple (*Acer saccharum*). The rock maple blooms in spring before the leaves appear and the flowers are visited by bees in great numbers. The red maple also yields nectar.

Milkweed (*Asclepias syriaca*). Where the milkweed is abundant it is a great help to the bee-keeper. In Michigan it is increasing, and perhaps also in Maine. The honey is excellent with a fruity flavor.

Mayweed (*Anthemis Cotula*). Common by the roadside, a bitter honey, apparently not important in this State.

Mustard (*Brassica*). Very abundant in grain fields, where the flowers often present an unbroken sheet of yellow. Probably never yields a surplus in Maine.

Pear (*Pyrus communis*). Not of much importance, but has been known to yield nectar very freely under suitable conditions.

Plums and Cherries (*Prunus*). All the species secrete nectar. The choke-cherry, which is common in thickets, attracts many insects.

Raspberry (*Rubus idaeus,* variety *aculeatissimus*). One of the best honey plants, where the forest has been lumbered. A splendid honey of the finest flavor, suggestive of the berry.

Sumac (*Rhus typhina*). This common shrub has the staminate and pistillate flowers on different individual plants. Not common enough in Maine to yield a surplus. Honey bright amber, with a bitter flavor at first which later disappears.

Sweet Clover (*Melilotus alba*). Does not grow well on the clay soil of this State, requires a limestone soil.

Willow (*Salix*). Valuable in spring for both pollen and nectar, a great help in building up the colonies and bridging over backward springs. The pussy willow (*Salix discolor*) is most important. It could be planted to advantage in useless wet land.

Willowherb (*Epilobium augustifolium*). Also called fireweed since it springs up abundantly on land which has been burnt over. An excellent honey plant; honey water white; flowers red-purple.

Bee-keepers desiring further information about the honey plants of this State are referred to John H. Lovell, Waldoboro, Maine, botanist to the A. I. Root Company.